

## NEW SPECIES OF *SEURECHINA* (NEMATODA: SEURATIDAE) PARASITIC IN DASYURID MARSUPIALS FROM AUSTRALIA

by L. R. SMALES

### Summary

SMALES, L. R. (1998) New species of *Seurechina* (Nematoda: Seuratidae) parasitic in dasyurid marsupials from Australia. *Trans. R. Soc. S. Aust.* 122(4), 179-184, 30 November, 1998.

*Seurechina hobbsi* sp. nov. is described from the stomach of *Phascogale tapoatafa* from Western Australia. It differs from *S. chancei*, the type and only described species, in being a larger worm (6-8 mm compared with 3.1-3.8 mm) with longer spicules (500-620  $\mu\text{m}$ ) for *S. hobbsi* compared with 185  $\mu\text{m}$  for *S. chancei*. *Seurechina spottii* sp. nov. is described from the stomach and small intestine of *Sminthopsis leucopus* and *Antechinus agilis* and is most closely related to *S. hobbsi* from which it differs in having three lateral papillae extending into the caudal alae rather than two, oval rather than spherical eggs and the absence of a large projecting lip anterior to the vulva.

KEY WORDS: *Seurechina*, nematodes, Seuratidae, Echinonematinae, Australia, Dasyuridae, marsupials.

### Introduction

Nematodes of the family Seuratidae are parasites of reptiles, birds, bats, rodents and Australian marsupials (Chabaud 1978). The family includes genera in which the mouth is dorso-ventrally elongated and flanked by paired lips and genera in which the mouth opening is triangular or hexagonal (Inglis 1967). All three genera occurring in Australian marsupials, *Seurechina*, *Inglechina* and *Linstowinema* spp., are contained in the subfamily Echinonematinae Inglis, 1967, characterised by a large mouth opening with no lip lobes, the anterior end of the body being swollen as a cephalic bulb bearing hooks, no pre-cloacal sucker on the male and a cloacal region covered by cuticular granulations. Although originally placed in the Schmeider-nematidae by Inglis (1967) the affinities of *Linstowinema* Smales, 1997 (formerly *Echiumema* Linstow, 1898 preoccupied) with the larvae of a species of *Seuratum* Hall, 1916 resulted in Quentin (1971) placing the Echinonematinae in the Seuratidae.

The genera *Linstowinema* and *Inglechina* Chabaud, Seurat, Beveridge, Bain & Durette-Desset, 1980, contain species with a triangular mouth opening on a swollen cephalic bulb bearing hooks. The monotypic genus *Seurechina* Chabaud, Seurat, Beveridge, Bain & Durette-Desset, 1980 however, has neither a triangular mouth opening nor a swollen cephalic bulb bearing hooks, although it does have other characteristics of the subfamily.

In this paper, two new species of *Seurechina* are

described. The definition of the subfamily Echinonematinae is re-evaluated and the relationships between the genera discussed.

### Materials and Methods

Nematodes collected from *Sminthopsis leucopus* and *Antechinus agilis* were fixed in hot 10% formalin and then stored in 70% ethanol. The preservation history of the specimens from *Phascogale tapoatafa* is unknown although they were stored in 70% ethanol. All nematodes were examined after clearing in lactophenol. Measurements for more than four specimens are given in micrometres, as the range followed by the mean in parentheses, and were made with the aid of an ocular micrometer or drawing tube and map measurer. Drawings were made with the aid of a drawing tube.

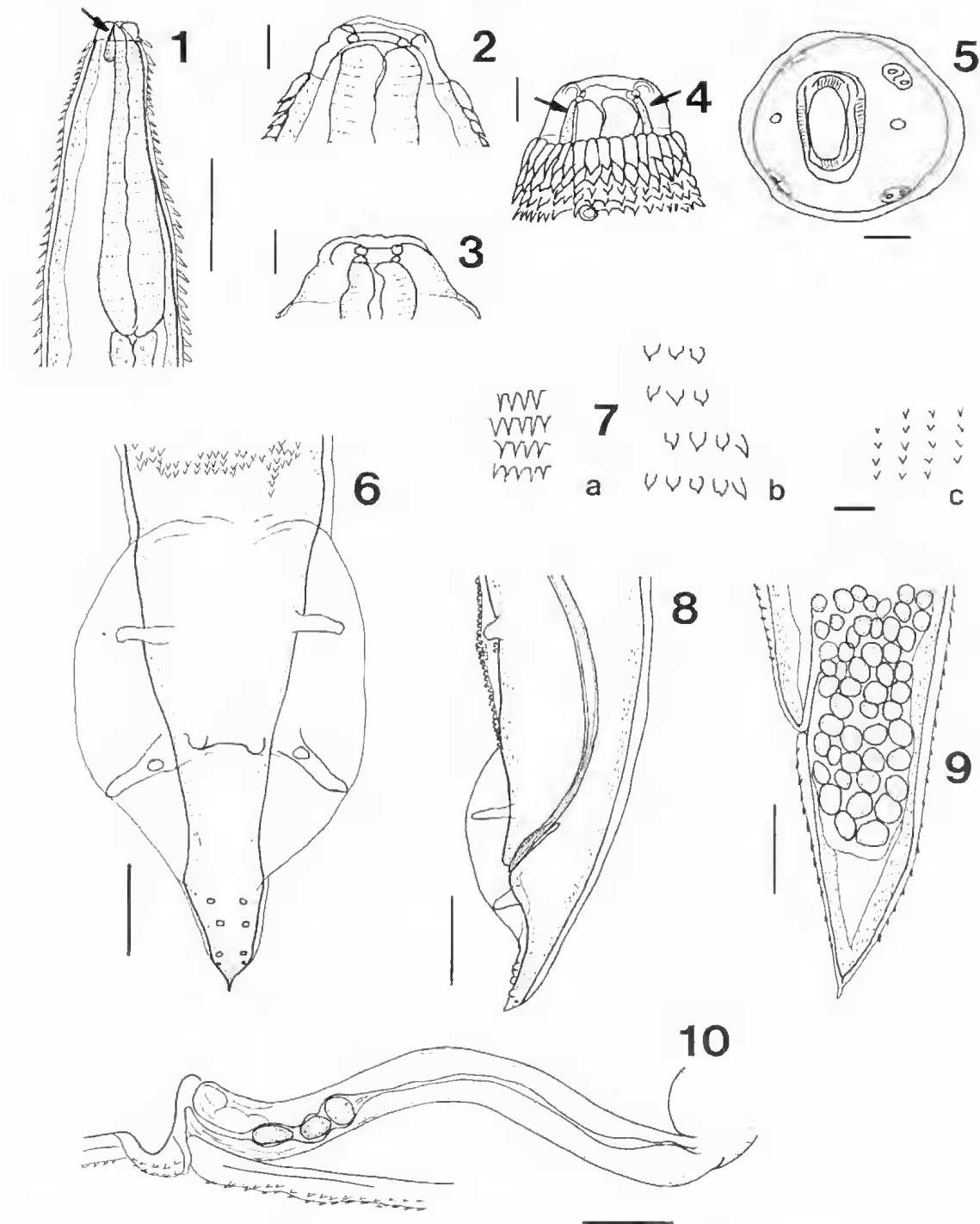
Type material has been deposited in the South Australian Museum, Adelaide (SAMA) and voucher specimens are held in the collection of CSIRO Wildlife and Ecology (CSIRO).

#### *Seurechina hobbsi* sp. nov. (FIGS 1-10)

**Type:** Holotype ♂, allotype ♀, paratypes 4 ♂, 17 ♀, from stomach of *Phascogale tapoatafa* (Meyer, 1793), Manjimup (34° 15' S, 116° 09' E) WA, June 1992, coll. S. Rhind, SAMA AHC 31262, AHC 31263 and AHC 31264, respectively.

**Material examined:** From *Phascogale tapoatafa* types.

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Figs 1-10. *Scurechina hobbsi* sp. nov. 1. Anterior end optical section, arrow indicating laminæ (lateral view). 2. Cephalic end, optical section (lateral view). 3. Cephalic end, optical section (dorsal view). 4. Cephalic end, arrows indicating laminæ (lateral view). 5. Cephalic end (*en face* view). 6. Male posterior end (ventral view). 7. Body spines. a. From oesophageal region. b. From mid body region. c. From posterior body region. 8. Male posterior end (lateral view). 9. Female posterior end (lateral view). 10. Vagina (lateral view). Scale bars = 200 µm 1; 10 µm 5; 100 µm 6, 8, 9; 50 µm 10; 25 µm 2, 3, 4.

**Description**

Small worms, body with fine transverse cuticular annulations. Cephalic extremity without spines, remainder of body with up to 50 rows of spines (mid body of female) at each annulation, extending over  $\frac{2}{3}$  body dorsally to caudal alae ventrally of male, over entire body of female; spines becoming progressively smaller towards posterior end. Anterior extremity with mouth opening and oral cavity elongated dorso-ventrally, bearing 2 pairs double cephalic papillae, pair amphids; without lips or lip-like structures. Anterior end of oesophagus capped by 2 oval, dorso-ventrally aligned sclerotised rings, enlarged dorsally and ventrally. Oesophagus surrounded at anterior end by 4 pairs laminae 80 long. Oesophagus simple, clayiform  $\frac{1}{16}$ - $\frac{1}{17}$  body length. Nerve ring and secretory-excretory pore not seen, deirids large, conical, at level of 5th row of spines.

**Male (n=5 unless otherwise stated) (Figs 1-8)**

Length 6.0-7.0 (6.5 mm), width 300-370 (340). Oesophagus 502-569 (536) long. Deirids 77-94 (85) from anterior end. Spicules equal, similar, without alae, 500-630 (590) long, about  $\frac{1}{11}$  body length. Gubernaculum 50 (n=1) long. Two pairs lateral pre-cloacal papillae, 1 pair extending into lateral alae; 1 pair lateral ad-cloacal papillae extending into lateral alae; 3 pairs post-cloacal papillae, 1 pair phasmids well posterior to cloaca near tail tip. Peri-cloacal papillae not seen. Tail 130-170 (150) long.

**Female (n=5 unless otherwise stated) (Figs 9, 10)**

Length 7.0-8.0 (7.8 mm), width 510-580 (550). Oesophagus 536-670 (610) long. Deirids not seen. Vagina 550 (n=1) long; vulva opening behind a large projecting lip, 2600-3450 (3000) from anterior end. Monodelphic. Tail 215-280 (255) long. Eggs spherical 40-54 (47) diameter.

**Etymology**

The species is named after Mr R. Hobbs who has been helpful in providing material for this work.

**Remarks**

The method of fixation used for this material was not ideal, most specimens being contracted and distorted. It was impossible to determine the number and arrangement of the peri-cloacal papillae on male specimens but lateral pre-, ad- and post-cloacal papillae could be seen. Their number and arrangement are similar to those of the type and only other species, *S. chaneeti*. *Seurechina hobbsi*, 6.8 mm long, is a larger worm than *S. chaneeti*, 3.1-3.8 mm, with longer spicules (500-630 in *S. hobbsi* compared with 185 in *S. chaneeti*). The posterior ventral body

spines cover the entire ventral body surface of male *S. hobbsi* whereas those of *S. chaneeti* terminate in two lateral bands (Chabaud *et al.* 1980, Fig. 1j p. 430). In *S. hobbsi* the female tail (215-280) is longer than that of *S. chaneeti* (120), the spherical eggs are larger (47 diameter compared with 40x35), the vulva is pre-equatorial compared with a post-equatorial vulva in *S. chaneeti*. *Seurechina hobbsi* is monodelphic, whereas *S. chaneeti* is didelphic.

***Seurechina spratti* sp. nov.**

(FIGS 11-19)

**Types:** Holotype ♂, allotype ♀ from stomach of *Smilthopsis leucopus* (Gray, 1842), Sidlings Swamp South, Timbillica State Forest (37° 18' S, 149° 45' E), NSW, 25.x.83, coll. P. Haycock, SAMA AHC 31265 and AHC 31266, respectively.

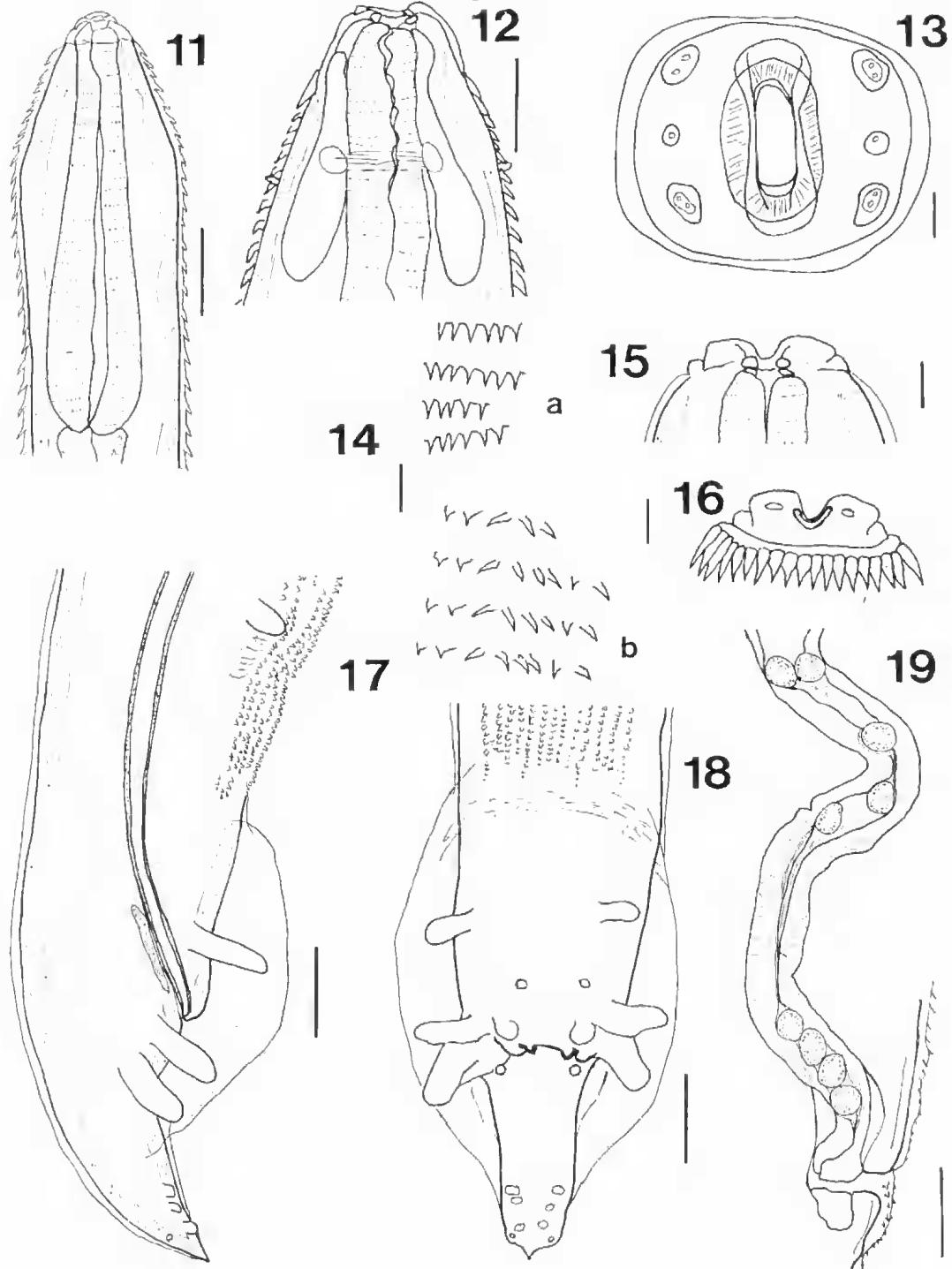
**Material examined:** From *Smilthopsis leucopus*; NSW, types; From stomach *Antechinus agilis* Dickman, Parnaby, Crowther & King, 1998; 20 ♂♂, 7 ♀♀, Sidlings Swamp North, Timbillica State Forest, NSW, 13.iv.87, 31.iii.88, coll. P. Haycock and E. L. Walter, CSIRO N2841, N2977.

**Description**

Small worms, body with fine transverse cuticular annulations. Cephalic extremity without spines, remainder of body with up to 46 rows spines (mid body of female) at each annulation, extending over  $\frac{2}{3}$  body dorsally to caudal alae ventrally of male, over entire body of female; spines becoming progressively smaller towards posterior end. Anterior extremity with mouth opening and oral cavity elongated dorso-ventrally, bearing 2 pairs double sub-median cephalic papillae, pair lateral amphids; without lips or lip-like structures. Anterior end of oesophagus capped by 2 oval dorso-ventrally aligned sclerotised rings, enlarged dorsally and ventrally. Oesophagus surrounded at anterior end by 4 pairs laminae 110-165 long. Oesophagus simple, clayiform,  $\frac{1}{16}$ - $\frac{1}{17}$  body length, nerve ring anterior to deirids, deirids large, conical, at level of about 6th-7th row of spines; secretory-excretory pore not seen.

**Male** (measurements of holotype followed by measurements of 2 ♂♂ from *A. agilis*) (Figs 11, 12, 14, 17, 18)

Length 4.8, 4.5-6 mm, width 220, 270-340. Oesophagus 470, 355-470 long. Nerve ring 85; deirids 110, 80-110 from anterior end. Spicules equal, similar, without alae, 500, 550-600 long, about  $\frac{1}{11}$  body length. Gubernaculum not seen in holotype, 50-58 in specimens from *A. agilis*. Two pairs of lateral pre-cloacal papillae; 1 pair extending into lateral alae, 2 pairs lateral ad-cloacal papillae



Figs 11-19. *Seurechima spratti* sp. nov. 11. Anterior end, optical section (lateral view). 12. Cephalic end, optical section (lateral view). 13. Anterior end (*en face* view). 14. Body spines. a. From oesophageal region. b. From mid body region. 15. Cephalic end, optical section (dorsal view). 16. Cephalic end (dorsal view). 17. Male posterior end (lateral view). 18. Male posterior end (ventral view). 19. Vagina (lateral view). Scale bars = 100 µm 11, 19; 50 µm 12, 17, 18; 25 µm 14, 15, 16; 10 µm 13.

extending into lateral alae. 3 pairs peri-cloacal papillae; 3 pairs post-cloacal papillae; 1 pair phasmids well posterior to cloaca near tail tip. Anterior lip of cloaca with swollen lateral edges simulating pair of supplementary papillae. Tail 130, 165-200 long.

**Female** (measurements of allotype followed by measurements of 7 ♀♀ from *A. agilis*) (Figs 13, 15, 16, 19)

Length 6.8, 6.0-7.0 mm (6.9), width 470, 300-630 (400). Oesophagus 600, 380-570 (485 long). Nerve ring, secretory-excretory pore, deirids not seen. Vagina 340, 450 (n=1) long. Vulva 2950, 2975-3485 (3150) from anterior end. Monodelphic. Tail 240, 190-290 (250) long. Eggs oval 33-53 (47) long by 23-33 (27) wide.

#### Etymology

The species is named after Dr D. M. Spratt in recognition of his contribution to our understanding of the helminths of dasyurids.

#### Remarks

The secretory-excretory pore, tiny and concealed between body spines close to the anterior end, is often difficult to detect in echinonematines. In this species, the anterior ends of all worms from *A. agilis* were contracted, to a greater or lesser extent during fixation, obscuring the secretory-excretory pore. This may have occurred because the heads of the worms were embedded in the mucosa at post-mortem examination (D. M. Spratt pers. comm. 1998). Measurements of oesophageal length were also affected by the state of fixation, those of females from *A. agilis* being apparently shorter than that of the female from *S. leucopus*. Other measurements of specimens from the two hosts were consistent with their belonging to a single species.

*Seurechina spratti* most closely resembles *S. hobbsi* in size, length of spicules, distribution of body spines, position of vulva, being monodelphic and the length of the tail in both the male and female. All of these characters distinguish both *S. hobbsi* and *S. spratti* from *S. chaneeti*. *Seurechina spratti* can be readily distinguished from both *S. hobbsi* and *S. chaneeti* in having three rather than two large lateral papillae extending into the caudal alae. *Seurechina spratti* has oval eggs whereas those of *S. hobbsi* are spherical. *Seurechina spratti* lacks the large projecting lip anterior to the vulva found in *S. hobbsi*.

*Seurechina chaneeti* was described from *Dasyurus hallucatus* Gould, 1842 from Koolan Island, off the coast of north Western Australia. *S. hobbsi* from *P. tapoatafa* (Meyer, 1793) from the southern

mainland of Western Australia and *S. spratti* from *S. leucopus* (Gray, 1842) and *A. agilis* Dickman, Parnaby, Crowther & King, 1998 from southeastern New South Wales near the Victorian border. The differences between *S. chaneeti* and the other two species may be explained, at least partly, by geographic separation. The similarities between *S. hobbsi* and *S. spratti* could be the result of a common ancestor in coastal Victoria and/or New South Wales, where the ranges of the three host species overlap (Summer & Dickman 1998; Soderquist 1995).

#### Discussion

Inglis (1967) created the subfamily Echinonematinae to accommodate the genus *Echinonema* (sic), and placed it within the Schmidernematidae, rather than the Seuratidae because of its long simple spicules, short gubernaculum and a triradiate mouth opening without lips. The affinity of the Echinonematinae with the Seuratidae was discovered by Quentin (1971) and confirmed by Chabaud *et al.* (1980). They linked the presence of a simple, lipless, triradiate mouth opening, two pairs of doubled, submedian cephalic papillae, a very shallow cheilstome, and characteristic spines on the body cuticle of adults with the Seuratidae, and with larval development in *Seuratina* sp.

When the genus *Seurechina* was erected by Chabaud *et al.* (1980), these authors discussed its lack of cephalic hooks but placed it in the Echinonematinae along with the genera, *Linstowinema* (formerly *Echinonema* prencei) and *Inglechima*, which also occur in dasyurid hosts. They did not comment upon the fact that *Seurechina* has an oval mouth opening nor upon the significance of the dorso-ventrally elongated cuticular structure between the oesophagus and the mouth opening. At present this chitinous cup, the walls of which are made up of two superimposed rings (Chabaud *et al.* 1980), is not interpreted as part of a cheilstome as defined by Inglis (1967) but rather as associated with an oesophastome. The four pairs of sublateral laminae found in the cephalic hypodermis were noted by Chabaud *et al.* (1980) as appearing to be dilatations of the lateral fields, possibly playing a role in a mechanism to hold the cervical spines steady when they are embedded in the gastric mucosa. These structures have not been found in other echinonematines (Chabaud *et al.* 1980; Smales 1997).

For the time being it is convenient to retain *Seurechina* within the Echinonematinae until the developmental relationships of the mouth, oesophagus and associated structures have been determined. The genus could either be moved to

the Seuratinae on the basis of a bilaterally symmetrical mouth opening, necessitating emendation of the diagnosis of the Echinonematinae to accommodate adult worms with an oval mouth opening, or, alternatively new groupings could be established.

### Acknowledgments

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